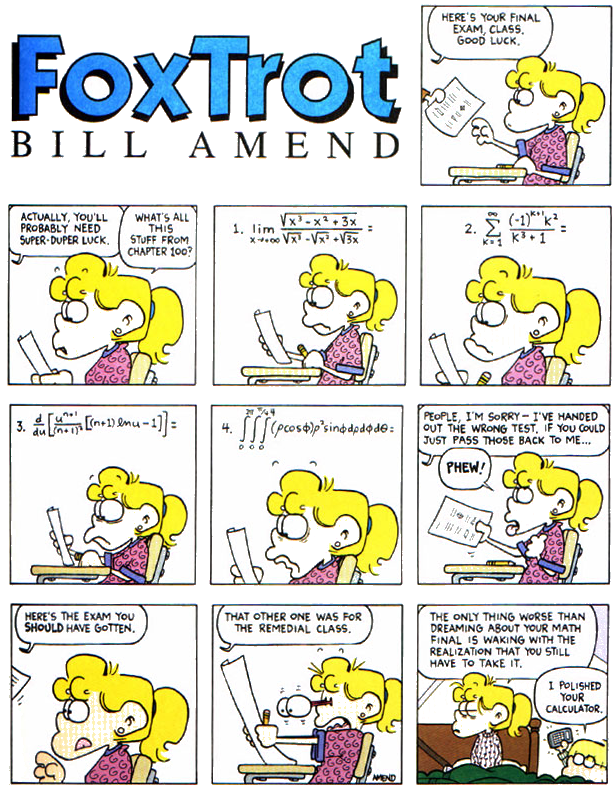
**Analytic Trigonometry Unit 09 Problems**



**Law of Sines and Cosines**

= =

or

= =

Note: not drawn

to scale

A

B

C

a

b

c

1) Given B = 29º

b = 15

c = 21

What is angle C ?

2) Given a = 10

b = 19

A = 32º

Calculate if there is:

a) One triangle b) Two triangles c) No triangles

3) Given that B = 52º

*a*2 = *b*2 + *c*2 – 2*bc* cosA *or* A = cos-1((a2-b2-c2)/(-2bc))

*or*

*b*2 = *a*2 + *c*2 – 2*ac* cosB *or* B = cos-1((b2-a2-c2)/(-2ac))

*or*

*c*2 = *a*2 + *b*2 – 2*ab* cosC *or* C = cos-1((c2-a2-b2)/(-2ab))

a = 9

c = 7

What is angle A?

4) Calculate the value of angle A, given that: a is 12"

b is 10"

c is 6"

**Complex Numbers**

5) *i* equals:

1. b) 0 c) –1 d) unknown, it’s a variable

6) *i* 5 equals:

a) *i* b) – *i* c) 1 d) –1

7) The impedance in one component of an AC series circuit is z1 = 17 + *j*·24 ohms, and the

impedance in another component of the circuit is z2 = 46 – *j*·51 ohms. The total impedance

zT for a series circuit is the sum of the impedances for its individual components:

zT = z1 + z2

Calculate the impedance in this circuit:

8) Complex numbers are used in electronics to describe the current in an AC circuit

Ohm's law relates the current in a circuit *Ɪ* in amperes, the voltage of a circuit *V* in volts

and the resistance of the circuit *R* in ohms by the formula: *V* = *I R*

Calculate *V*, the voltage of a circuit, if *I* = (29 – *j*·13) amperes and *R* = (15 + *j*·8) ohms:

**Polar to Rectangular Coordinates**

**Polar to Rectangular**

For point P = (r,*θ*)

x = r cos*θ*

y = r sin*θ*

9) The rectangular coordinates for the polar coordinate (17, π/3) are:

**Rectangular to Polar Coordinates**

## Rectangular to Polar

*r* = 

*θ* = arctan *y*/*x*

10) The polar coordinates for the rectangular coordinate (, ) are:

**Polar Form**

**Polar Form**

From: a + b*i*

To: z = r (cos θ + i sin θ)

where r = and θ = arctan(b/a)

11) Calculate the polar form of: /2 – *i*

**Rectangular Form**

**Rectangular Form**

From: z = r(cos*θ + i* sin*θ*

To a + b*i* where a = r cos*θ*

b = r sin*θ*

12) Calculate the rectangular form of z = 12(cos π/5 + *i* sin π/5)

**Absolute Value of a Complex Number**

**Absolute Value of**

**a Complex Number**

|a + b*i*| =

13) Calculate the absolute value of the complex number z = 7 – 6*i*

**DeMoivre's Theorem**

**DeMoivre's Theorem (Power of a**

**Complex Number)**

z n = [ *r* (cos *θ* + *i* sin *θ*)] n =

*r* n(cos n*θ* + *i* sin n*θ*)

for n>0

14) Use DeMoivre's Theorem to calculate [4(cos 30° + *i* sin 30°)]3

15) Use DeMoivre's Theorem to calculate z = (6 + 8*i* )5

**Vectors**

16) Calculate the magnitude of the vector: **v** = –2**i** – 4**j**

Hint:

Magnitude: | a + b*i* | =

a) 20 b) c) 2 d) –

**Vector Operations**

17) Calculate –3**v** for **v** = –2**i** – **j**

a) –6**i** + 3**j** b) 6**i** – 3**j** c) –6**i** – 3**j** d) 6**i** + 3**j**

18) Calculate **v** + **w**  where: **v** = 2**i** – 6**j** and  **w** = 3**i** + 4**j**

a) –5**i** – 2**j** b) 5**i** + 2**j** c) 2**i** – 5**j** d) 5**i** – 2**j**

**Position Vector**

19) In which quadrant is the terminal point of the vector **v** = 5**i** – 3**j** ?

a) I b) II c) III d) IV

20) In which quadrant will the terminal point of –2**v** be if **v** = 2**i** + 2**j** ?

a) I b) II c) III d) IV

21) In which quadrant will the terminal point of –3**v** be given if **v** = –**i** + **j**

a) I b) II c) III d) IV

22) A vector has the initial point: (–1, 1) and terminal point: (2, –2).

Hint

**v =** (x2 -x1) **i +** (y2 -y1) **j**

What is the position vector?

a) **i** b) 3**i** – 3**j** c) –2**i** – **j** d) –3**i** – 2**j**

23) Calculate the unit vector that has the same direction as the vector: **v** = 4**j**

a) 2**j** b) –**j** c) **j** d) **i**

24) A football quarterback throws the football with a speed of

Hint

**v** = ||**v**||(cos *θ* **i** + sin *θ* **j**)

48 feet per second at an angle of 45 degrees upward from

the ground. The vector that describes the motion of the

football is:

a) 68**i** + 68**j** b) 30**i** + 30**j** c) 34**i** + 34**j** d) 34**i** – 34**j**

**Dot Product**

Hint

**v ● w** = a1 a2+ b1 b2

25) Calculate the dot product of vector **v** and vector **w** if:

**v** = 2**i** – 3**j and w** = **i** – **j**

a) –18 b) –4 c) 5 d) 13