

Semester 2 Final Review
Chpts. 7, 9, 10-12

1)

a) $f(x) = \sin^3 x + \cos^3 x + \tan x$

$$f(x) = \sin^3 x + \cos^3 x \left(\frac{\sin x}{\cos x} \right)$$

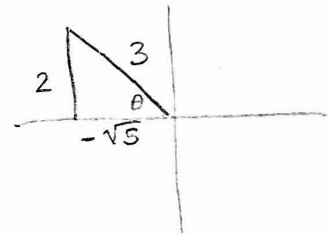
$$f(x) = \sin^3 x + \cos^2 x (\sin x)$$

$$f(x) = \sin x (\sin^2 x + \cos^2 x)$$

$$f(x) = \sin x (1)$$

$$\boxed{f(x) = \sin x}$$

b) $\sin \theta = \frac{2}{3}$



$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$\sin 2\theta = 2 \left(\frac{2}{3} \right) \left(-\frac{\sqrt{5}}{3} \right)$$

$$\boxed{\sin 2\theta = -\frac{4\sqrt{5}}{9}}$$

$$2) \quad y = a + b \cos \left(\frac{2\tilde{\pi}}{K} t \right)$$

$$\text{Max } 14.3$$

$$\text{min } 10.3$$

$$\text{amp} = 2$$

$$\text{up } 12.3$$

$$\boxed{a = 12.3}$$

$$\boxed{b = 2}$$

$$\frac{2\tilde{\pi}}{K} = 12 \text{ hrs}$$

$$2\tilde{\pi} = 12K$$

$$\boxed{\frac{\tilde{\pi}}{6} = K}$$

$$3) \quad 2 \sin^2 \theta + \sin \theta - 1 = 0$$

$$(2 \sin \theta - 1)(\sin \theta + 1) = 0$$

$$\sin \theta = \frac{1}{2}$$

$$\boxed{\pi/6, 5\pi/6}$$

$$\sin \theta = -1$$

$$\boxed{\frac{3\pi}{2}}$$

4) TWO cases

$$\frac{\sin 23}{9.5} = \frac{\sin y}{17}$$

$$y = 44.36$$

$$z = 112.64^\circ$$

$$\frac{\sin 23}{9.5} = \frac{\sin 112.64}{x}$$

$$x = 22.4$$

OR

$$y = 135.64$$

$$z = 21.36$$

$$\frac{\sin 23}{9.5} = \frac{\sin 21.36}{x}$$

$$x = 8.86$$

5)

$$\frac{\sin 63}{x} = \frac{\sin 14}{9}$$

$$x = 29.1$$

6)

1) $1 \dots 1 \frac{(1+1)}{2} = \frac{1(2)}{2} = 1$ ✓

2) Assume $1+2+3+\dots+n = \frac{n(n+1)}{2}$

3) Prove $1+2+3+\dots+n+n+1 \rightarrow \frac{(n+1)(n+2)}{2}$

$$1+2+3+\dots+n+(n+1)$$
$$\frac{n(n+1)}{2} + (n+1)$$

$$\frac{n^2+n}{2} + \frac{2n+2}{2}$$

$$\frac{n^2 + 3n + 2}{2}$$

$$\frac{(n+2)(n+1)}{2}$$

$$\boxed{\frac{(n+1)(n+2)}{2}}$$

7.

a) 7

b) -4

c) $\frac{20}{2}(-4 + 129)$

$$\boxed{1250}$$

8.

a) $r = 3$

b) $S_8 = 0.8(3)^{8-1} = \boxed{1749.6}$

c) $35,000 = \frac{0.8(1-3^n)}{1-3}$

$$-87500 = 1-3^n$$

$$87501 = 3^n$$

$$\ln 87501 = n \ln 3$$

$$10.36 = n$$

$$\boxed{n=11}$$

$$9) a) u_n = u_1 (r)^{n-1}$$

$$6 = u_1 (r)^1$$

$$\frac{6}{r} = u_1$$

$$20.25 = u_1 (r)^4$$

$$20.25 = \frac{6}{r} r^4$$

$$20.25 = 6r^3$$

$$\boxed{r = 1.5}$$

$$b) 6 = u_1 (1.5)^1$$

$$\boxed{u_1 = 4}$$

$$c) 200 = \frac{4(1.5^n - 1)}{(1.5 - 1)}$$

$$26 = 1.5^n$$

$$\ln 26 = n \ln(1.5)$$

$$8.03 = n$$

$$\boxed{7}$$

$$10) 160 (.8)^{n-1}$$

$n = \min$

$$750 = 160 (.8)^{n-1}$$

$$4.69 = .8^{n-1}$$

$$\ln(4.69) = (n-1) \ln .8$$

$$-5.9 = n$$

$$S_{\infty} = \frac{160}{1-.8}$$

$$S_{\infty} = 800$$

$$S_{10} = \frac{160(.8^{10} - 1)}{.8 - 1}$$

$$\boxed{S_{10} = 714}$$

* In 10 minutes he only goes 714 meters

$$11) a) r = 0.19$$

x = time (years) after 2016

$$P = 50,000 (0.9)^{x-1}$$

$$P = 50,000 (0.9)^4$$

$$P = 32805$$

$$b) 25,000 = 50,000 (.9)^x$$

$$\frac{1}{2} = .9^x$$

$$\ln(1/2) = x (\ln .9)$$

$$x = 6.58 \text{ years}$$