MA1021 **"PERFECT QUIZ"** **B'10**

Section **B01 & $\boxed{\text{B02}}$** NAME JAMES BOND
Circle **Print**

(30 points total)

1. (1.1, #37) (4 pts) Express the circumference C of a circle as a function of its area A.

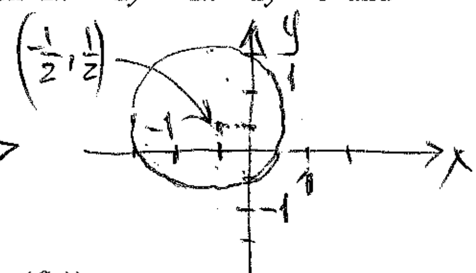
$$C = 2\pi r \longrightarrow C = 2\pi\sqrt{\frac{A}{\pi}} = 2\sqrt{\pi A} \Rightarrow \underline{C(A) = 2\sqrt{\pi A}}$$

$$A = \pi r^2 \longrightarrow r = \sqrt{\frac{A}{\pi}}$$

2. (1.2, #15) (5 pts) Sketch the translated circle corresponding to the equation $2x^2 + 2y^2 + 2x - 2y = 1$ and indicate its center and radius.

$$2x^2+2y^2+2x-2y=1; \quad x^2+x+\frac{1}{4}+y^2-y+\frac{1}{4}=1$$

$$x^2+y^2+x-y=\frac{1}{2}; \quad \left(x+\frac{1}{2}\right)^2+\left(y-\frac{1}{2}\right)^2=1 \Rightarrow$$



3. (1.4, #17) (4 pts) Given and $f(x) = \sin x$ and $g(x) = x^3$, find $f(g(x)$ and $g(f(x))$.

$$f(x) = \sin x;\ g(x) = x^3 \Rightarrow \begin{cases} f(g(x)) = f(x^3) = \sin x^3 \\ g(f(x)) = g(\sin x) = (\sin x)^3 = \sin^3 x \end{cases}$$

4. (2.1, #19) (6 pts) Find all points of the curve $y = x - (x/10)^2$ at which the tangent line is horizontal.

$$y = x - \left(\frac{x}{10}\right)^2 = -\frac{x^2}{100} + x$$

m for $f \Rightarrow m(a) = -\frac{a}{50} + 1$

$m(a) = 0$ when $a = 50$;

$y = -\frac{50^2}{10^2} + 50 = -\frac{2500}{100} + 50 = 25$, so the tangent line is horiz. @ $(50,25)$

5. (2.2, # 13) (5 pts) Apply the limit laws to evaluate the limit $\lim_{z\to 8}\frac{z^{2/3}}{z-\sqrt{2z}}$

$$\lim_{z\to 8}\frac{z^{\frac{2}{3}}}{z-\sqrt{2z}} = \frac{\lim_{z\to 8} z^{\frac{2}{3}}}{\lim_{z\to 8}\left(z-\sqrt{2z}\right)} = \frac{4}{4} = \underline{1}$$

6. (2.3, # 21) (6 pts) Find the trigonometric limit $\lim_{x\to 0} x\cot 3x$

$$\lim_{x\to 0} x\cot 3x = \lim_{x\to 0} x\frac{\cos 3x}{\sin 3x} = \lim_{x\to 0}\frac{3x}{\sin 3x}\cdot\frac{\cos 3x}{3} = \lim_{x\to 0}\left(\frac{3x}{\sin 3x}\right)\lim_{x\to 0}\left(\frac{\cos 3x}{3}\right) =$$

$$= \lim_{x\to 0}\frac{1}{\left(\frac{\sin 3x}{3x}\right)}\lim_{x\to 0}\left(\frac{\cos 3x}{3}\right) = 1\cdot\frac{1}{3} = \frac{1}{3}$$