Mathematics 012A
Test 2, November 10, 2006
Solutions

Part A	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Answers	**B**	**D**	**B**	**A**	**A**	**E**	**D**	**D**	**B**	**E**	**C**	**B**	**C**	**E**	**A**	**A**	**B**	**C**	**B**	**D**

Part B

B1. $\dfrac{\left(8x^3y^{3/2}\right)^{2/3}}{\left(4x^2y^{4/3}\right)^{1/2}} = \dfrac{\left(4x^2y\right)}{\left(2xy^{2/3}\right)} = 2xy^{\frac{1}{3}}$

B2. $\dfrac{1}{\log_8 a} + \dfrac{1}{\log_4 a} = \log_a 8 + \log_a 4 = \log_a 2^3 + \log_a 2^2 = 3\log_a 2 + 2\log_a 2 = 5\log_a 2$

$= \dfrac{5}{\log_2 a}$ *so* $M = 5$

B3. $\log_2 x + \log_2(x+6) = 4 \Rightarrow \log_2 x(x+6) = 4 \Rightarrow x(x+6) = 16 \Rightarrow x^2 + 6x - 16 = 0$
or $(x-2)(x+8) = 0 \Rightarrow x = 2$ since $x = -8$ is inadmissable

B4. $f'(x) = 3x^2 - 12 = 3(x^2 - 4) = 3(x-2)(x+2)$ so $x = -2$ is a critical point
Consider $f(-3) = 14,\ f(-2) = 21, f(0) = 5;$
so $f_{\max} = 21$ *at* $x = -3$ *and* $f_{\min} = 5$ *at* $x = 0$

B5. $4x^3 + 9x^2y + 3x^3y' - 3y^2y' = 0 \Rightarrow 3(x^3 - y^2)y' = -(4x^3 + 9x^2y) \Rightarrow y' = \dfrac{-(4x^3 + 9x^2y)}{3(x^3 - y^2)}$

B6. $A = xy$ where $2x + 3y = 1200$ or $y = \dfrac{1200 - 2x}{3} = 400 - \dfrac{2x}{3}$ so $A = x(400 - \dfrac{2x}{3})$

or $A = 400x - \dfrac{2x^2}{3}$ on [0, 600] The endpoints can be ignored.

$A' = 400 - \dfrac{4x}{3} = 0$ Þ $x = 300,\ y = 200$ so $A_{max} = 60{,}000\,m^2$